



## SEQUENCE LISTING

<110> Milich, David R.  
Billaud, Jean-Noel

<120> Human Hepatitis B Virus Core Proteins as Vaccine Platforms and  
Methods of Use Thereof

<130> VACCINE-07971

<140> 10/630,074

<141> 2003-07-30

<160> 101

<170> PatentIn version 3.2

<210> 1

<211> 188

<212> PRT

<213> Woodchuck hepatitis B virus

<400> 1

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu  
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp  
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys  
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu  
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln  
65 70 75 80

Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys  
85 90 95

Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln  
100 105 110

His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr  
115 120 125

Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro  
130 135 140

Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser  
145 150 155 160

Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro  
165 170 175

Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys  
180 185

<210> 2  
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<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 2

Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr  
1 5 10 15

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser  
20 25 30

Gln Ser Pro Ser Ala Asn Cys  
35

<210> 3  
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<213> Woodchuck hepatitis B virus

<400> 3

Arg Arg Arg Cys  
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<210> 4  
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<400> 4

Arg Arg Arg Arg Cys  
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<210> 5  
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<400> 5

Lys Lys Lys Cys  
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<210> 6  
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<213> Woodchuck hepatitis B virus

<400> 6

Ala Ala Ala Cys  
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<210> 7  
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<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 7

Ala Ala Gly Gly Ala Arg Ala Ser Arg Ser Pro Ser Gln Ser Pro Ser  
1 5 10 15

Gln Ser Pro Ser Ala Asn Cys  
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<210> 8  
<211> 21  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 8

Ala Ala Gly Gly Ala Arg Ala Ser Arg Ser Gln Ser Pro Ser Gln Ser  
1 5 10 15

Pro Ser Ala Asn Cys  
20

<210> 9  
<211> 20  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 9

Ala Ala Gly Gly Ala Arg Ala Ser Arg Ser Gln Ser Ser Gln Ser Pro  
1 5 10 15

Ser Ala Asn Cys  
20

<210> 10  
<211> 19  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 10

Ala Ala Gly Gly Ala Arg Ala Ser Arg Ser Gln Ser Ser Gln Ser Ser  
1 5 10 15

Ala Asn Cys

<210> 11  
<211> 15  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 11

Arg Arg Gly Gly Ala Arg Ala Ser Gln Ser Pro Ser Ala Asn Cys  
1 5 10 15

<210> 12  
<211> 15  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 12

Ala Arg Gly Gly Ala Arg Ala Ser Gln Ser Pro Ser Ala Asn Cys  
1 5 10 15

<210> 13  
<211> 15  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 13

Arg Ala Gly Gly Ala Arg Ala Ser Gln Ser Pro Ser Ala Asn Cys  
1 5 10 15

<210> 14  
<211> 15  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 14

Ala Ala Gly Gly Ala Arg Ala Ser Gln Ser Pro Ser Ala Asn Cys  
1 5 10 15

<210> 15  
<211> 18  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 15

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Arg Glu Ser  
1 5 10 15

Gln Cys

<210> 16  
<211> 18  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 16

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Pro Ser Ala  
1 5 10 15

Asn Cys

<210> 17  
<211> 17  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 17

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Ser Ala Asn  
1 5 10 15

Cys

<210> 18  
<211> 15  
<212> PRT  
<213> Woodchuck hepatitis B virus

<400> 18

Ala Ala Gly Arg Ser Gln Ser Pro Ser Gln Ser Ser Ala Asn Cys  
1 5 10 15

<210> 19  
 <211> 16  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 19

Ala Ala Gly Arg Ser Pro Ser Gln Ser Ser Gln Ser Ser Ala Asn Cys  
 1 5 10 15

<210> 20  
 <211> 14  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 20

Ala Ala Gly Arg Ser Gln Ser Ser Gln Ser Ser Ala Asn Cys  
 1 5 10

<210> 21  
 <211> 187  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 21

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu  
 1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp  
 20 25 30

Thr Ala Ala Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys  
 35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Glu Glu  
 50 55 60

Leu Thr Arg Leu Ile Thr Trp Met Ser Glu Asn Thr Thr Glu Glu Val  
 65 70 75 80

Arg Arg Ile Ile Val Asp His Val Asn Asn Thr Trp Gly Leu Lys Val  
 85 90 95

Arg Gln Thr Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His  
 100 105 110

Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro  
115 120 125

Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu  
130 135 140

His Thr Val Ile Arg Arg Arg Gly Gly Ser Arg Ala Ala Arg Ser Pro  
145 150 155 160

Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg  
165 170 175

Arg Arg Arg Ser Gln Ser Pro Ala Ser Asn Cys  
180 185

<210> 22  
<211> 39  
<212> PRT  
<213> Ground squirrel hepatitis virus  
<400> 22

Arg Arg Arg Gly Gly Ser Arg Ala Ala Arg Ser Pro Arg Arg Arg Thr  
1 5 10 15

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser  
20 25 30

Gln Ser Pro Ala Ser Asn Cys  
35

<210> 23  
<211> 23  
<212> PRT  
<213> Ground squirrel hepatitis virus  
<400> 23

Ala Ala Gly Gly Ser Arg Ala Ala Arg Ser Pro Ser Gln Ser Pro Ser  
1 5 10 15

Gln Ser Pro Ala Ser Asn Cys  
20

<210> 24  
<211> 21  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 24

Ala Ala Gly Gly Ser Arg Ala Ala Arg Ser Gln Ser Pro Ser Gln Ser  
1 5 10 15

Pro Ala Ser Asn Cys  
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<210> 25  
<211> 20  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 25

Ala Ala Gly Gly Ser Arg Ala Ala Arg Ser Gln Ser Ser Gln Ser Pro  
1 5 10 15

Ala Ser Asn Cys  
20

<210> 26  
<211> 19  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 26

Ala Ala Gly Gly Ser Arg Ala Ala Arg Ser Gln Ser Ser Gln Ser Ala  
1 5 10 15

Ser Asn Cys

<210> 27  
<211> 15  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 27

Arg Arg Gly Gly Ser Arg Ala Ala Gln Ser Pro Ala Ser Asn Cys  
1 5 10 15



<210> 28  
<211> 15  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 28

Ala Arg Gly Gly Ser Arg Ala Ser Gln Ser Pro Ala Ser Asn Cys  
1 5 10 15

<210> 29  
<211> 15  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 29

Arg Ala Gly Gly Ser Arg Ala Ser Gln Ser Pro Ala Ser Asn Cys  
1 5 10 15

<210> 30  
<211> 15  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 30

Ala Ala Gly Gly Ser Arg Ala Ser Gln Ser Pro Ala Ser Asn Cys  
1 5 10 15

<210> 31  
<211> 18  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 31

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Arg Glu Ser  
1 5 10 15

Gln Cys

<210> 32  
<211> 18  
<212> PRT  
<213> Ground squirrel hepatitis virus

<400> 32

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Pro Ala Ser  
1 5 10 15

Asn Cys

<210> 33  
 <211> 17  
 <212> PRT  
 <213> Ground squirrel hepatitis virus

<400> 33

Ala	Ala	Gly	Arg	Ser	Pro	Ser	Gln	Ser	Pro	Ser	Gln	Ser	Ala	Ser	Asn
1				5					10					15	

Cys

<210> 34  
 <211> 15  
 <212> PRT  
 <213> Ground squirrel hepatitis virus

<400> 34

Ala	Ala	Gly	Arg	Ser	Gln	Ser	Pro	Ser	Gln	Ser	Ala	Ser	Asn	Cys
1				5					10				15	

<210> 35  
 <211> 16  
 <212> PRT  
 <213> Ground squirrel hepatitis virus

<400> 35

Ala	Ala	Gly	Arg	Ser	Pro	Ser	Gln	Ser	Ser	Gln	Ser	Ala	Ser	Asn	Cys
1				5					10					15	

<210> 36  
 <211> 14  
 <212> PRT  
 <213> Ground squirrel hepatitis virus

<400> 36

Ala	Ala	Gly	Arg	Ser	Gln	Ser	Ser	Gln	Ser	Ala	Ser	Asn	Cys
1				5				10					

<210> 37  
 <211> 567  
 <212> DNA  
 <213> Woodchuck hepatitis B virus

<400> 37

atggacatag atccctataa agaatttggg tcatcttatac agttgttgaa ttttcttcct	60
ttggacttct ttcctgacct taatgctttg gtggacactg ctactgcctt gtatgaagaa	120
gagctaacag gtagggaaca ttgctctccg caccatacag ctattagaca agcttttagta	180
tgctgggatg aattaactaa attgatagct tggatgagct ctaacataac ttctgaacaa	240

gtaagaacaa tcattgtaaa tcatgtcaat gatacctggg gacttaaggt gagacaaagt 300  
 ttatgggtttc atttgtcatg tctcactttc ggacaacata cagttcaaga atttttagta 360  
 agttttggag tatggatcag gactccagct ccatatagac ctcctaatagc acccattctc 420  
 tcgactcttc cggaacatac agtcattagg agaagaggag gtgcaagagc ttctaggtcc 480  
 cccagaagac gcactccctc tcctcgcagg agaagatctc aatcaccgcg tcgcagacgc 540  
 tctcaatctc catctgccaa ctgctga 567

<210> 38  
 <211> 149  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 38

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu  
 1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp  
 20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys  
 35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu  
 50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln  
 65 70 75 80

Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys  
 85 90 95

Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln  
 100 105 110

His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr  
 115 120 125

Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro  
 130 135 140

Glu His Thr Val Ile  
 145

<210> 39  
 <211> 564  
 <212> DNA  
 <213> Woodchuck hepatitis B virus

<400> 39  
 atggacatag atccctataa agaatttggg tcttcttattc agttgttgaa ttttcttcct 60  
 ttggactttt ttcctgatct caatgcattg gtggacactg ctgctgctct ttatgaagaa 120  
 gaattaacag gtagggagca ttgttctcct catcatactg ctattagaca ggccttagtg 180  
 tgttgggaag aattaactag attaattaca tggatgagtg aaaatacaac agaagaagtt 240  
 agaagaatta ttgttgatca tgtcaataat acttggggac ttaaagtaag acagacttta 300  
 tggtttcatt tatcatgtct tacttttggg caacacacag ttcaagaatt tttggtagt 360  
 tttggagtat ggattagaac tccagctcct tatagaccac ctaatgcacc cattttatca 420  
 actcttccgg aacatacagt ctaggagaga agaggaggtt caagagctgc taggtccccc 480  
 cgaagacgca ctccctctcc tcgcaggaga aggtctcaat caccgcgtcg cagacgtctc 540  
 caatctccag cttccaactg ctga 564

<210> 40  
 <211> 148  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 40

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu  
 1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp  
 20 25 30

Thr Ala Ala Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys  
 35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Glu Glu  
 50 55 60

Leu Thr Arg Leu Ile Thr Trp Met Ser Glu Asn Thr Thr Glu Glu Val  
 65 70 75 80

Arg Arg Ile Ile Val Asp His Val Asn Asn Thr Trp Gly Leu Lys Val  
 85 90 95

Arg Gln Thr Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His  
 100 105 110

Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro  
 115 120 125

Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu  
 130 135 140

His Thr Val Ile  
 145

<210> 41  
 <211> 183  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 41

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu  
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp  
 20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys  
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu  
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala  
 65 70 75 80

Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys  
 85 90 95

Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg  
 100 105 110

Glu Thr Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr  
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro  
 130 135 140

Glu Thr Thr Val Val Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr  
 145 150 155 160

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser  
 165 170 175

Gln Ser Arg Glu Ser Gln Cys  
 180

<210> 42  
 <211> 34  
 <212> PRT  
 <213> Homo sapiens

<400> 42

Arg Arg Arg Gly Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg  
 1 5 10 15

Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Arg Glu Ser  
 20 25 30

Gln Cys

<210> 43  
 <211> 18  
 <212> PRT  
 <213> Homo sapiens

<400> 43

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Arg Glu Ser  
 1 5 10 15

Gln Cys

<210> 44  
 <211> 16  
 <212> PRT  
 <213> Homo sapiens

<400> 44

Ala Ala Gly Arg Ser Gln Ser Pro Ser Gln Ser Arg Glu Ser Gln Cys  
 1 5 10 15

<210> 45  
<211> 15  
<212> PRT  
<213> Homo sapiens

<400> 45

Ala Ala Gly Arg Ser Gln Ser Ser Gln Ser Arg Glu Ser Gln Cys  
1 5 10 15

<210> 46  
<211> 14  
<212> PRT  
<213> Homo sapiens

<400> 46

Ala Ala Gly Arg Ser Gln Ser Ser Gln Ser Glu Ser Gln Cys  
1 5 10

<210> 47  
<211> 11  
<212> PRT  
<213> Homo sapiens

<400> 47

Arg Arg Gly Ser Gln Ser Arg Glu Ser Gln Cys  
1 5 10

<210> 48  
<211> 11  
<212> PRT  
<213> Homo sapiens

<400> 48

Ala Arg Gly Ser Gln Ser Arg Glu Ser Gln Cys  
1 5 10

<210> 49  
<211> 11  
<212> PRT  
<213> Homo sapiens

<400> 49

Arg Ala Gly Ser Gln Ser Arg Glu Ser Gln Cys  
1 5 10

<210> 50  
<211> 11  
<212> PRT  
<213> Homo sapiens

<400> 50

Ala Ala Gly Ser Gln Ser Arg Glu Ser Gln Cys  
1 5 10

<210> 51  
<211> 18  
<212> PRT  
<213> Homo sapiens

<400> 51

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Pro Ser Ala  
1 5 10 15

Asn Cys

<210> 52  
<211> 18  
<212> PRT  
<213> Homo sapiens

<400> 52

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Arg Glu Ser  
1 5 10 15

Gln Cys

<210> 53  
<211> 17  
<212> PRT  
<213> Homo sapiens

<400> 53

Ala Ala Gly Arg Ser Pro Ser Gln Ser Pro Ser Gln Ser Glu Ser Gln  
1 5 10 15

Cys



<210> 54  
 <211> 15  
 <212> PRT  
 <213> Homo sapiens

<400> 54

Ala	Ala	Gly	Arg	Ser	Gln	Ser	Pro	Ser	Gln	Ser	Glu	Ser	Gln	Cys
1				5				10					15	

<210> 55  
 <211> 16  
 <212> PRT  
 <213> Homo sapiens

<400> 55

Ala	Ala	Gly	Arg	Ser	Pro	Ser	Gln	Ser	Ser	Gln	Ser	Glu	Ser	Gln	Cys
1				5				10						15	

<210> 56  
 <211> 14  
 <212> PRT  
 <213> Homo sapiens

<400> 56

Ala	Ala	Gly	Arg	Ser	Gln	Ser	Ser	Gln	Ser	Glu	Ser	Gln	Cys
1				5				10					

<210> 57  
 <211> 552  
 <212> DNA  
 <213> Woodchuck hepatitis B virus

<400> 57

atggacatcg acccttataa agaatttgga gctactgtgg agttactctc gtttttgcct	60
tctgacttct ttccttcagt acgagatctt ctagataccg cctcagctct gtatcgggaa	120
gccttagagt ctctgagca ttgttcacct caccatactg cactcaggca agcaattctt	180
tgctgggggg aactaatgac tctagctacc tgggtgggtg ttaatttgga agatccagca	240
tccagagacc tagtagtcag ttatgtcaac actaatatgg gcctaaagt caggcaactc	300
ttgtgggttc acatttcttg tctcactttt ggaagagaaa ccgttataga gtatttggtg	360
tctttcggag tgtggattcg cactcctcca gcttatagac caccaaatgc ccctatccta	420
tcaacacttc cggaaactac tggtgttaga cgacgaggca ggtcccctag aagaagaact	480
ccctgcctc gcagacgaag gtctcaatcg ccgcgtcgca gaagatctca atctcgggaa	540
tctcaatggt ga	552

<210> 58  
 <211> 149  
 <212> PRT  
 <213> Woodchuck hepatitis B virus

<400> 58

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ala Thr Val Glu Leu Leu  
 1 5 10 15

Ser Phe Leu Pro Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp  
 20 25 30

Thr Ala Ser Ala Leu Tyr Arg Glu Ala Leu Glu Ser Pro Glu His Cys  
 35 40 45

Ser Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu  
 50 55 60

Leu Met Thr Leu Ala Thr Trp Val Gly Val Asn Leu Glu Asp Pro Ala  
 65 70 75 80

Ser Arg Asp Leu Val Val Ser Tyr Val Asn Thr Asn Met Gly Leu Lys  
 85 90 95

Phe Arg Gln Leu Leu Trp Phe His Ile Ser Cys Leu Thr Phe Gly Arg  
 100 105 110

Glu Thr Val Ile Glu Tyr Leu Val Ser Phe Gly Val Trp Ile Arg Thr  
 115 120 125

Pro Pro Ala Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro  
 130 135 140

Glu Thr Thr Val Val  
 145

<210> 59  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 59

Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro  
 1 5 10

<210> 60  
<211> 12  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 60

Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala  
1 5 10

<210> 61  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 61

Val Cys Trp Asp Glu Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn  
1 5 10 15

Ile Thr Ser Glu Gln  
20

<210> 62  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 62

Leu Cys Trp Gly Glu Leu Met Thr Leu Ala Thr Trp Val Gly Gly Asn  
1 5 10 15

Leu Glu Asp Pro Ile  
20

<210> 63  
<211> 19  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 63  
ggaaattcctt ctcctcgag

<210> 64  
<211> 24  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 64

Met Ser Leu Leu Thr Glu Val Glu Thr Pro Ile Arg Asn Glu Trp Gly  
1 5 10 15

Cys Arg Cys Asn Asp Ser Ser Asp  
20

<210> 65  
<211> 18  
<212> PRT  
<213> Plasmodium vivax

<400> 65

Ala Asn Gly Ala Gly Asn Gln Pro Gly Ala Asn Gly Ala Gly Asp Gln  
1 5 10 15

Pro Gly

<210> 66  
<211> 18  
<212> PRT  
<213> Plasmodium vivax

<400> 66

Ala Asn Gly Ala Asp Asn Gln Pro Gly Ala Asn Gly Ala Asp Asp Gln  
1 5 10 15

Pro Gly

<210> 67  
<211> 22  
<212> PRT  
<213> Plasmodium vivax

<400> 67

Ala Pro Gly Ala Asn Gln Glu Gly Gly Ala Ala Ala Pro Gly Ala Asn  
1 5 10 15

Gln Glu Gly Gly Ala Ala  
20

<210> 68  
 <211> 12  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Synthetic

<400> 68

Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro  
 1 5 10

<210> 69  
 <211> 260  
 <212> PRT  
 <213> Mus musculus

<400> 69

Met Ile Glu Thr Tyr Ser Gln Pro Ser Pro Arg Ser Val Ala Thr Gly  
 1 5 10 15

Leu Pro Ala Ser Met Lys Ile Phe Met Tyr Leu Leu Thr Val Phe Leu  
 20 25 30

Ile Thr Gln Met Ile Gly Ser Val Leu Phe Ala Val Tyr Leu His Arg  
 35 40 45

Arg Leu Asp Lys Val Glu Glu Glu Val Asn Leu His Glu Asp Phe Val  
 50 55 60

Phe Ile Lys Lys Leu Lys Arg Cys Asn Lys Gly Glu Gly Ser Leu Ser  
 65 70 75 80

Leu Leu Asn Cys Glu Glu Met Arg Arg Gln Phe Glu Asp Leu Val Lys  
 85 90 95

Asp Ile Thr Leu Asn Lys Glu Glu Lys Lys Glu Asn Ser Phe Glu Met  
 100 105 110

Gln Arg Gly Asp Glu Asp Pro Gln Ile Ala Ala His Val Val Ser Glu  
 115 120 125

Ala Asn Ser Asn Ala Ala Ser Val Leu Gln Trp Ala Lys Lys Gly Tyr  
 130 135 140

Tyr Thr Met Lys Ser Asn Leu Val Met Leu Glu Asn Gly Lys Gln Leu  
 145 150 155 160

Thr Val Lys Arg Glu Gly Leu Tyr Tyr Val Tyr Thr Gln Val Thr Phe  
165 170 175

Cys Ser Asn Arg Glu Pro Ser Ser Gln Arg Pro Phe Ile Val Gly Leu  
180 185 190

Trp Leu Lys Pro Ser Ser Gly Ser Glu Arg Ile Leu Leu Lys Ala Ala  
195 200 205

Asn Thr His Ser Ser Ser Gln Leu Cys Glu Gln Gln Ser Val His Leu  
210 215 220

Gly Gly Val Phe Glu Leu Gln Ala Gly Ala Ser Val Phe Val Asn Val  
225 230 235 240

Thr Glu Ala Ser Gln Val Ile His Arg Val Gly Phe Ser Ser Phe Gly  
245 250 255

Leu Leu Lys Leu  
260

<210> 70  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Synthetic

<400> 70

Gly Glu Ile Lys Asn Cys Ser Phe Asn Ile Ser Thr Ser Ile Arg Gly  
1 5 10 15

Lys Val Gln Lys Glu Tyr Ala Phe Phe  
20 25

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Leu Thr Ser Cys Asn Thr Ser Val Ile Thr Gln Ala Cys Pro Lys Val  
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Ser Phe Glu Pro Ile Pro Ile His Tyr Cys  
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Pro Lys Val Ser Phe Glu Pro Ile Pro Ile His Tyr Cys Ala Pro Ala  
1 5 10 15

Gly Phe Ala Ile Leu Lys Cys Asn Asn  
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Thr His Gly Ile Arg Pro Val Val Ser Thr Gln Leu Leu Leu Asn Gly  
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Ser Leu Ala Glu Glu Glu  
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Asp Arg Ala Ala Gly Gln Pro Ala Gly Asp Arg Ala Asp Gly Gln Pro  
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Ala Gly

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Asn Ala Asn Pro Asn Val Asp Pro Asn Ala Asn Pro Asn Ala Asn Pro  
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Asn Ala Asn Pro  
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Ser Leu Leu Thr Glu Val Glu Thr Pro Ile Arg Asn Glu Trp Gly Cys  
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Arg Cys Asn Asp Ser Ser Asp  
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<210> 77  
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Ser Leu Leu Thr Glu Val Glu Thr Pro Ile Arg Asn Glu Trp Gly Ala  
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Arg Ala Asn Asp Ser Ser Asp  
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Lys Lys Lys Val Thr Ala Gln Glu Leu Asp  
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<400> 79

Phe Gly Phe Pro Glu His Leu Leu Val Asp Phe Leu Gln Ser Leu Ser  
1 5 10 15

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<400> 80

Phe Tyr Glu Ile Ile Met Asp Ile Glu Gln Asn Asn Val Gln Gly Lys  
1 5 10 15

Gln Gly Leu Gln Lys Leu  
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Met Glu Leu Arg Lys Asn Gly Arg Gln Cys Gly Met Ser Glu Lys Glu  
1 5 10 15

Glu Glu

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<400> 82

Leu Glu Glu Lys Lys Gly Asn Tyr Val Val Thr Asp His  
1 5 10

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Asp Ala Glu Phe Arg His Asp Ser Gly Tyr Glu Val  
1 5 10

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Phe Arg His Asp Ser Gly Tyr  
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<210> 85  
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<400> 85

Arg Ile Lys Gln Ile Gly Met Pro Gly Gly Lys  
1 5 10

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<400> 86

Leu Leu Glu Leu Asp Lys Trp Ala Ser Leu  
1 5 10

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<400> 87

Glu Gln Glu Leu Leu Glu Leu Asp Lys Trp Ala Ser Leu Trp  
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<400> 88

Asp Thr Gly Phe Leu Ala Ala Leu  
1 5

<210> 89  
<211> 8  
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Tyr Cys Phe Thr Pro Ser Pro Val  
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Cys Phe Arg Lys His Pro Glu Ala  
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<400> 91

Glu Ala Thr Tyr Ser Arg Cys Gly  
1 5

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<400> 92

His Leu His Gln Asn Ile Val Asp  
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<210> 93  
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<400> 93

Arg Tyr Asn Arg Asn Ala Val Pro Asn Leu Arg Gly Asp Leu Gln Val  
1 5 10 15

Leu Ala Gln Lys Val Ala Arg Thr Leu Phe  
20 25

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<400> 94

Thr Ala Val Val His Gln Leu Lys Arg Lys His  
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His Leu Leu Gln Leu Thr Val Trp Gly Ile Lys Gln Leu Gln Ala Arg  
1 5 10 15

<210> 96  
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<212> PRT  
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<220>  
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Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg Ala  
1 5 10 15

Leu Met Arg Ser Thr Thr Lys  
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<210> 97  
<211> 19  
<212> PRT  
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<220>  
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<400> 97

Gly Arg Glu Arg Arg Pro Arg Leu Ser Asp Arg Pro Gln Leu Pro Tyr  
1 5 10 15

Leu Glu Ala

<210> 98  
<211> 16  
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<400> 98

Asp Pro Pro Pro Pro Asn Pro Asn Asp Pro Pro Pro Pro Asn Pro Asn  
1 5 10 15

<210> 99  
<211> 14  
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Glu Glu Lys Lys Lys Val Thr Ala Gln Glu Leu Asp Glu Glu  
1 5 10

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Glu Glu Phe Arg His Asp Ser Gly Tyr Glu Glu  
1 5 10

<210> 101  
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Glu Glu Arg Ile Lys Gln Ile Gly Met Pro Gly Gly Lys Glu Glu  
1 5 10 15